Methodology for CCS in the CDM

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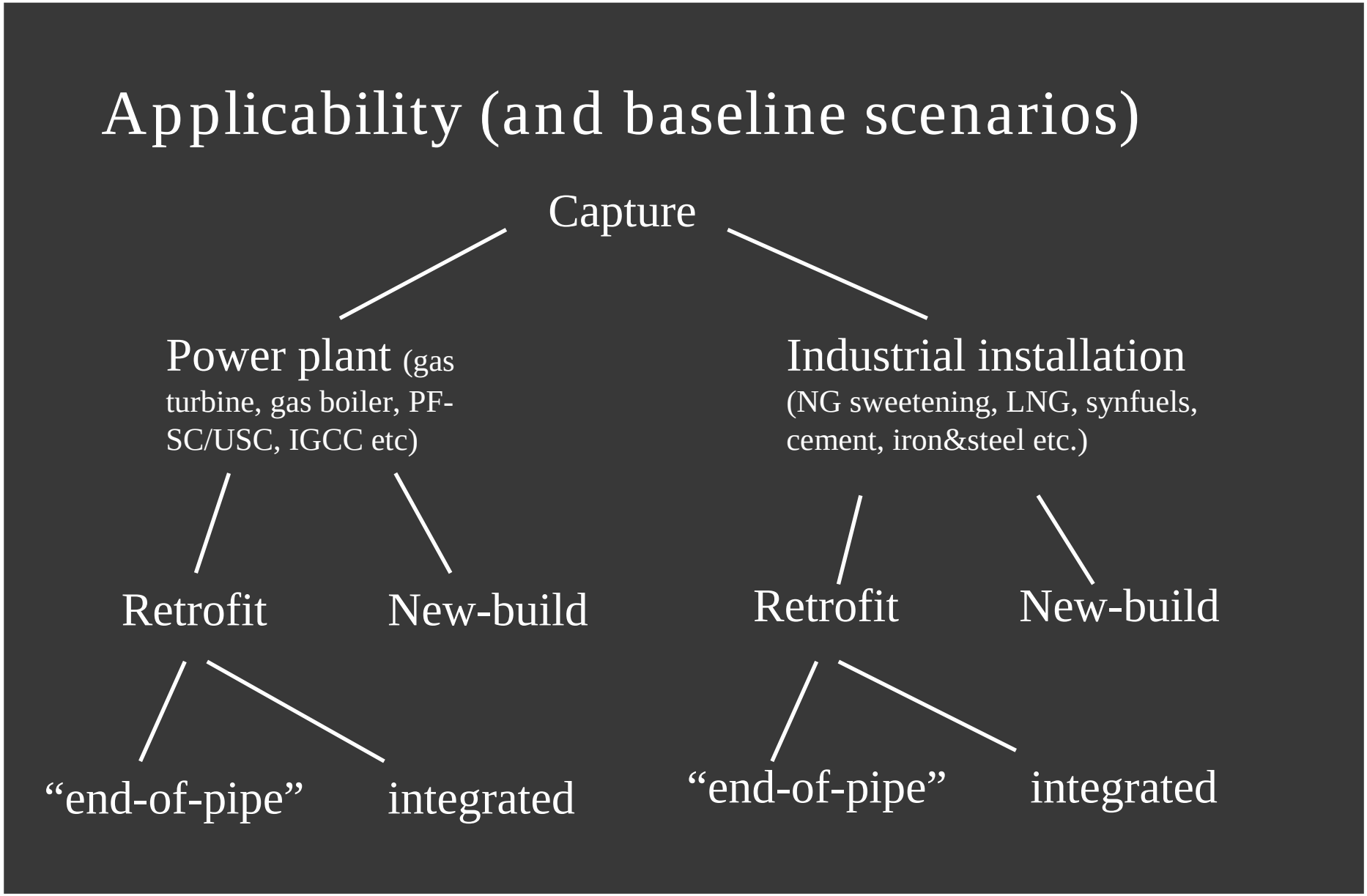
Overview

- **Key issues for a methodology**
  - Applicability
  - Project Boundary
  - Baseline
  - Leakage
  - Accounting & monitoring: above ground, below ground
  - Quality Assurance / Quality Control
- **Permitting / Environmental Impact Assessment (EIA)**
- **Project Approvals**

Applicability

- **Desire to develop methodology with ranging applicability criteria *inter alia*:**
  - Power plants (gas, coal (PF-SC/USC)
  - Gas processing (offshore, onshore, LNG knockout)
  - Synfuels
  - Other major point sources (refineries, cement etc.)
  - Transport (pipeline, tanker)
  - Storage (saline formations, O&G resrvr's, EOR)

Applicability (and baseline scenarios)



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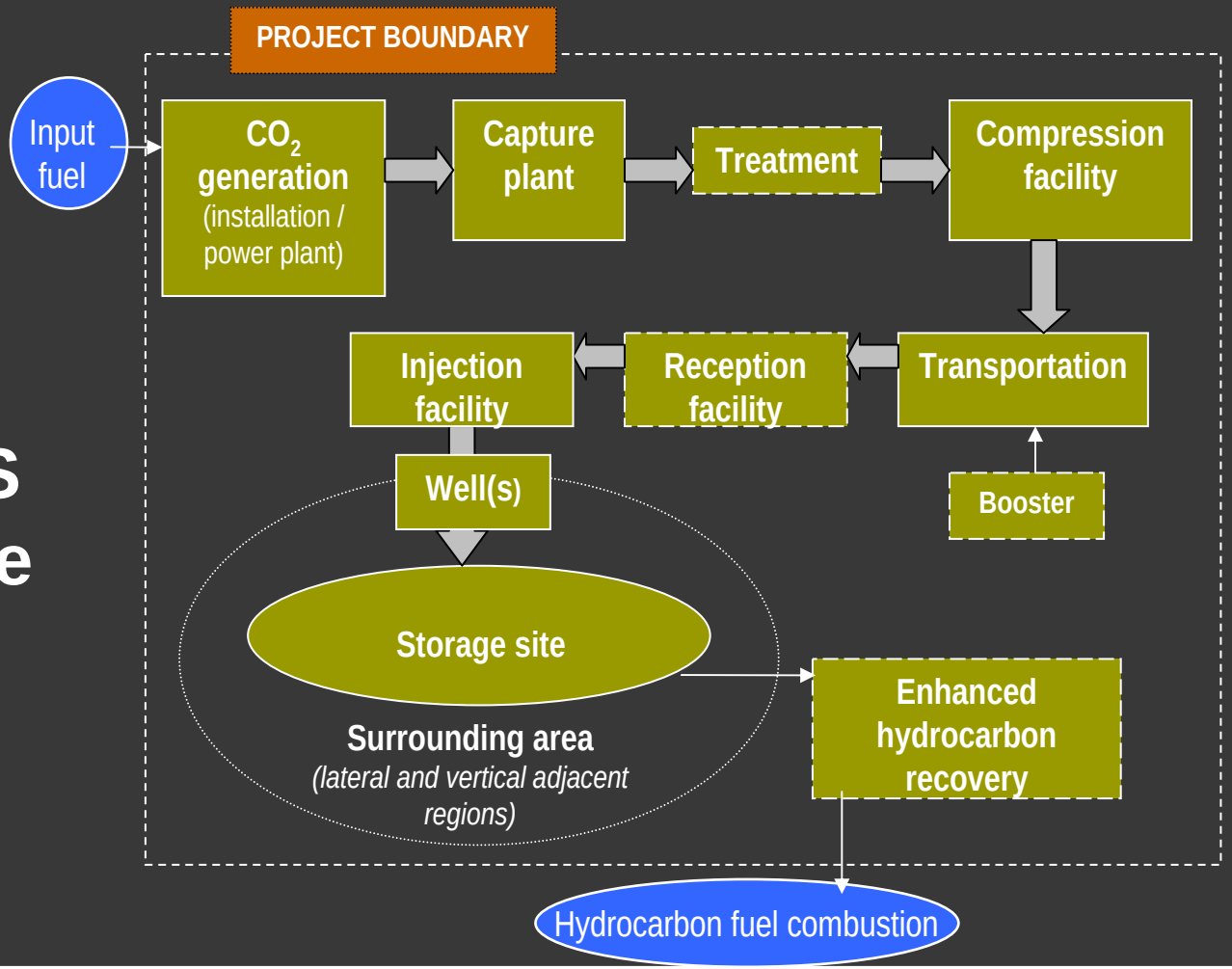
Applicability - Precedents in CDM

- **ACM0002 – Grid connected renewables**
  - Applicability: *not applicable to renewables switching from fossil fuels, since the baseline may be the continued use of fossil fuels at the site*
- **ACM0009 – Fuel switch in industrial installation**
  - Applicability: *switch from coal or petroleum fuels to gas. No capacity extension to power or plant output*
- **AM0029 – Natural gas grid connected power**
  - Applicability: *new gas fired power plants only*
- ***Need to define new applicability conditions based on system presented previously. Must carefully consider reasons for certain clauses in applicability criteria to ensure consistency with CDM precedents***

Project boundary (& leakage)

- **All elements of the CCS chain to be included**



Baseline - introduction

- **Baseline [scenario] is…**

  …the scenario which reasonably represents anthropogenic emission that would occur in the absence of the project

- **Three types of baseline approaches (para 48, MA)**

  1. Existing actual or historical emissions, as applicable;
  2. Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment;
  3. The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

Issues for the baseline

New build (greenfield) power plants

- **Choice of fuel (coal v gas)**
- **Consider plant type choice (IGCC v PF etc)**
- ***Build margin* versus *operating margin* (for grid connected power)**
- ***<Renewables only get combined margin>***

Retrofit or 'pure' streams

- **More straightforward**
- **Simply emissions without CCS (?)**
- **Consider bans on venting**
- **Impurities e.g. H2S**

Baseline – retrofit issues

1 GW_e coal plant

Baseline (historical) emissions

"End-of-pipe" retrofit

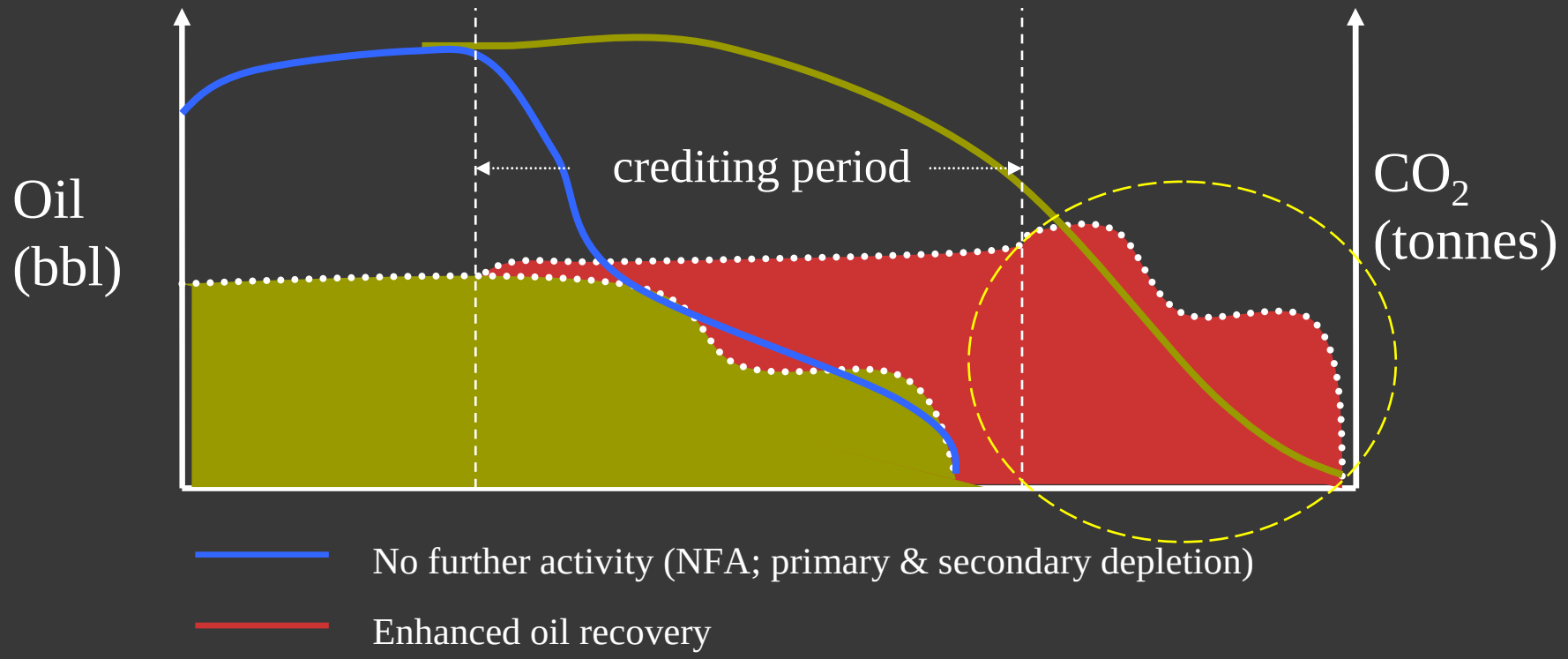
Integrated retrofit with a capacity extension

- Further issues:
  - **for an integrated retrofit, is there capture from the capture plant?**
- *For power plants, baseline calculation should be based on electrical output. More challenging for industrial installations, esp where there is little experience worldwide (e.g. synfuels)*

Baselines – precedents in CDM

- **ACM0002 – Grid connected renewables**
  - Baseline: *uses the combined margin. Could be applicable for new builds (note applicability excludes situations where replacing existing fossil plant [i.e. retrofit] as the baseline is historical emissions)*
- **ACM0009 – Fuel switch in industrial installation**
  - Baseline: *includes the CO_2 emissions from the combustion of the quantity of coal or petroleum fuel that would be used in each element process in absence of the project*
- **AM0029 – Natural gas grid connected power**
  - Baseline: *derived by multiplying the electrical output of the new plant with the EF of the baseline plant*
- ***Need to think carefully as to how to apply different baseline approaches / methodology for each CCS application outlined in the applicability criteria***

EOR – baselines and leakage



- **Leakage: Somehow need to consider combustion of the incremental oil produced**

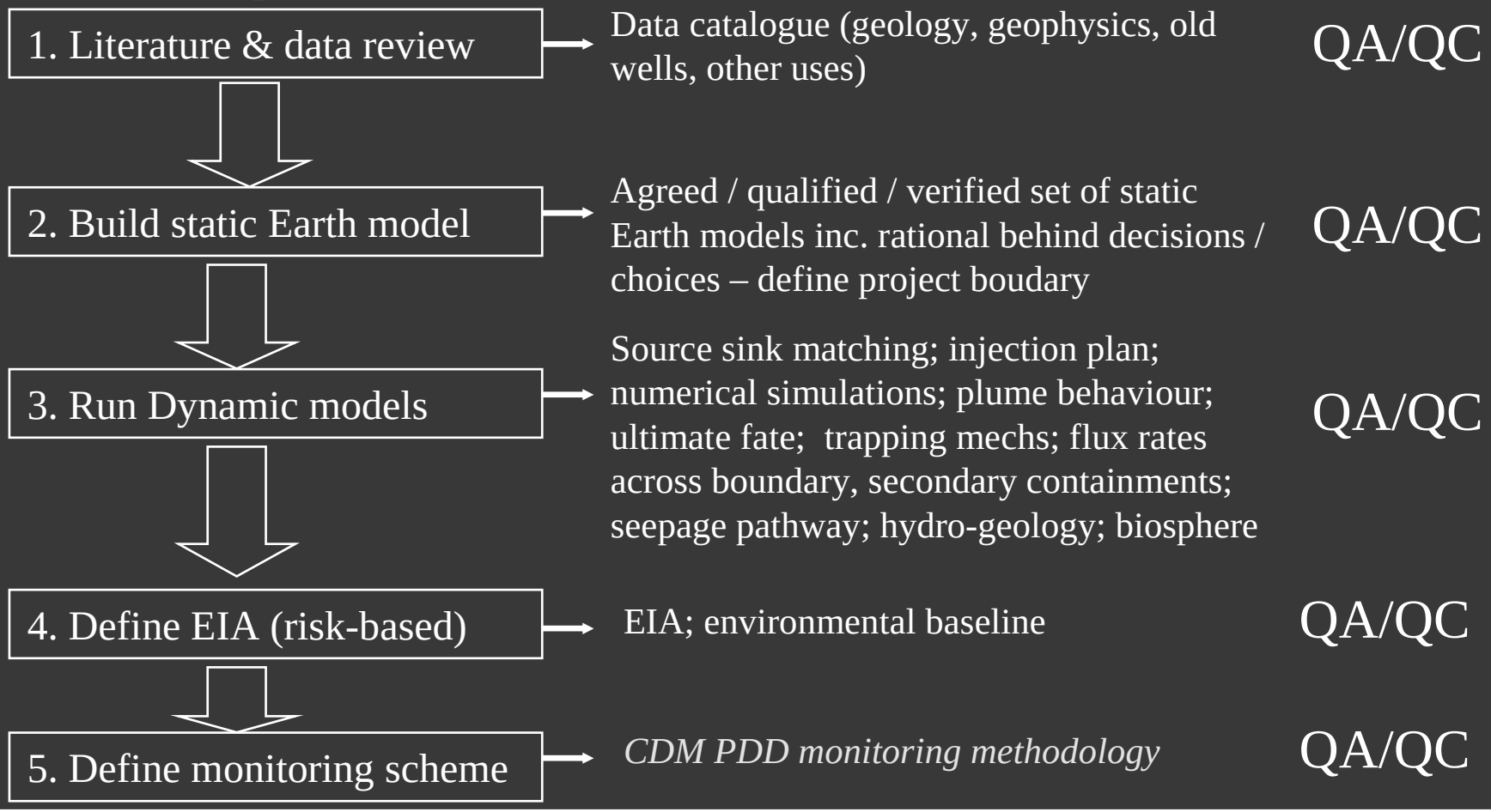
Accounting, M&R – above ground

- **Need to develop algorithms etc which can account for all emissions across the CCS chain**
  - Fugitive emissions: leaking pipelines, valves etc
  - Indirect emissions: additional power requirements for capture, transportation, injection (energy penalty, booster stations etc.)
- **Need to ensure account for *emission avoided*, not emissions *captured* or *stored***
- ***Does not present any major new issues (except the power piece), and can be drawn from existing methodologies***

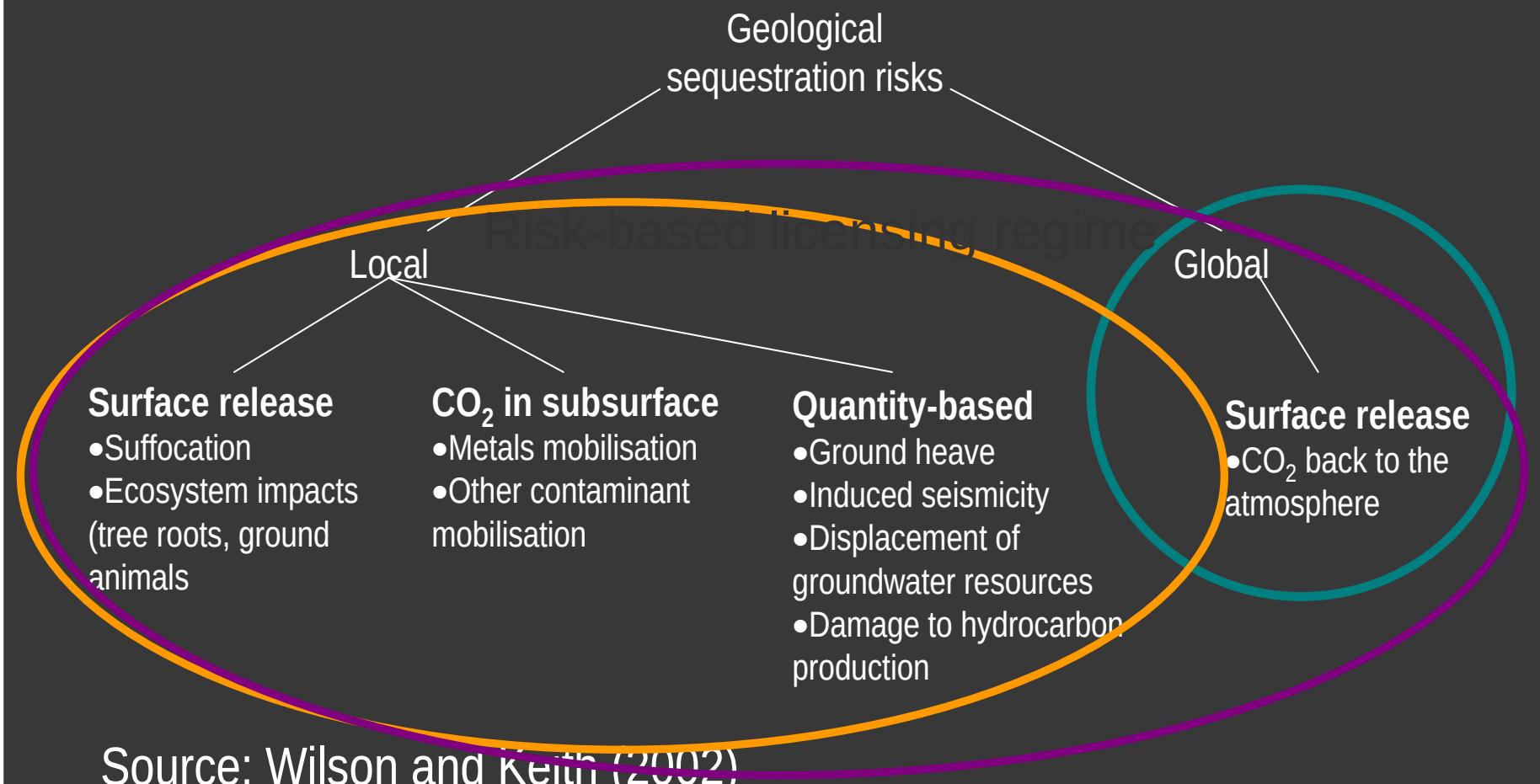
Accounting, M&R – below ground

- **Monitor storage site for seepage because:**
  - During crediting period = *project emissions*
  - Beyond crediting period = *permanence problem*
- **IPCC 2006 GHG g/lines form important basis**
  - Step-wise procedure not prescriptive techniques
  - Range of technologies = “shopping” list
  - Feed into EIA & boundaries definition
  - Iteration and adaptive learning key principles
- ***Will require expertise to estimate whether and how much seepage might have occurred***

M&R Below ground – key steps & documentation



Permitting CCS operations



Source: Wilson and Keith (2002)

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The role of the EIA

- **EIA will need to include:**
  - Environmental baseline study around storage site
  - Full carbon balance for the project
  - Assessment of sources – pathways – receptors
  - Remediation commitment & plan
  - Offset any emissions post crediting (until liability transfer)
  - Liability arrangements + stewardship/handover
  - Insurance could be an important component
- **Must be risk-based according to site and receptors**
- **EB could develop a set of guiding principles for CCS in CDM**

Project approvals

- **Critical step for including CCS in the CDM**
- **Issues include:**
  - Do DOEs have the sufficient skills to validate a CCS PDD?
  - Who Designates the OE? What competencies do they need? What criteria do they use?
  - Do NAI host-countries possess competencies for approving a CCS EIA?
  - What assurances does the CDM EB need?
  - What role could expert groups play?

Methodology for CCS in the CDM

Thank you

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